

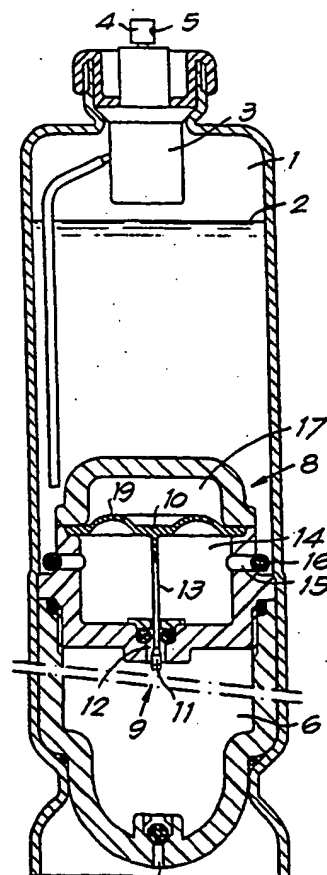
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/BE90/00023 <b>(22) International Filing Date:</b> 28 May 1990 (28.05.90)  <b>(30) Priority data:</b> 8900579 31 May 1989 (31.05.89) BE  <b>(71) Applicant (for all designated States except US):</b> S.McD. MURPHY & PARTNERS LTD [IE/IE]; 17 Dame Street, Dublin 3 (IE).  <b>(71)(72) Applicant and Inventor:</b> VAN DE MOORTELE, Guido [BE/BE]; Oosterveldlaan 71, B-2610 Wilrijk (BE).  <b>(74) Agent:</b> DONNÉ, E.; Bureau M.F.J. Bockstael N.V., Arenbergstraat 13, B-2000 Antwerpen (BE).		<b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent)*, DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), SU, US.  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Dutch).</i>

**(54) Title:** PRESSURE REGULATOR FOR SPRAY CANS AND MEMBRANE HEREWITH APPLIED**(57) Abstract**

Pressure regulator for spray cans, especially which make use of a valve (9) that is placed between a reservoir (6) which is destined to be filled with a gas under high pressure and a useful reservoir (1) of the spray can, and of a membrane (10) that commands the valve (9), characterised in that the pressure regulator (8) has a membrane (10) that mainly through means of its own elasticity provides the control operation of the valve (9).



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Pressure regulator for spray cans and membrane herewith applied.

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This invention relates to a pressure regulator for spray cans, especially a pressure regulator which makes use of a valve that is placed between a reservoir which is destined to be filled with a gas under high pressure and the useful reservoir of the spray can, and of a membrane that commands the valve. The invention also concerns the membrane which is applied for this.

It is known that a spray can may be equipped with a pressure capsule in order to put the medium to be dispersed under pressure. Such a pressure capsule consists mainly of a pressure reservoir that is destined to be filled with a gas under high pressure and a pressure regulator which releases gas out of the pressure reservoir into the useful reservoir of the spray can such until a well defined pressure, necessary for the dispersion of the medium, is created. The pressure regulator also then holds the pressure in the useful reservoir constant.

As known, such a pressure regulator has a movable wall, such as a membrane, which can work together with the valve body of the aforementioned valve. With the known embodiments the movable wall is put under pressure on the

one hand through the pressure which is created in the spray can and on the other hand through elastic means which act on the membrane, which either consist of a spring placed in an closed chamber, or of an amount of compressed gas at a well defined pressure which is notably higher than the atmospheric pressure, or through a combination of both.

These known pressure regulators show the disadvantage that their construction is relatively expensive, considering that in an automated fabrication process special means have to be foreseen either for the placing of the aforementioned springs, or for the filling of the chamber situated on one side of the membrane with gas under pressure. With fabrication of spray cans it is also a primary requirement for economic reasons that they may be manufactured with a minimum of fabrication steps.

The present invention also then relates to a pressure regulator for spray cans which can be manufactured in a particularly easy manner, whereby the aforementioned step, either the placing of the spring, or the installation of a well defined pressure in a space situated along one side of the membrane, is excluded.

For this purpose the invention consists of a pressure regulator for spray cans, in particular which make use of a valve that is placed between a reservoir that is destined to be filled with a gas under high pressure and the useful reservoir of the spray can, and of a membrane which commands the valve, with the characteristic that the pressure regulator has a membrane that mainly through its own elasticity provides the control operation of the valve. In the most preferable embodiment the pressure regulator then also shows no other single separate means that is special destined for the production of a well defined counteracting force on the membrane.

The desired magnitude of the control force can be achieved

for example by adjusting the thickness of the wall of the membrane, by prestressing the membrane, or also by adjusting the displacement of the membrane before the valve 9 is closed.

The membrane consists preferably of plastic. In the most preferably embodiment use is made of polyacetal or a plastic on base of polyacetal. Also other plastic such as polyamides, polysulphon and polypropylene may be used.

In order to better show the characteristics according to the present invention, some preferred embodiments are described hereafter, as examples and without any restrictive character with reference to the enclosed drawings, in which:

figure 1 shows in cross-section a spray can which makes use of a pressure regulator according to the invention;

figure 2 shows the spray can from figure 1 for another position of the pressure regulator;

figure 3 shows a variant of the invention.

In figure 1 a spray can with a pressure capsule is shown schematically. The spray can consists, as known, of a reservoir 1 for the medium 2 to be dispersed, a valve 3 to disperse the medium 2, and a push button 4 to operate the valve 3 which is provided with an outlet such as a spray opening 5. The pressure capsule which works together with the spray can consists mainly of a pressure reservoir 6, which is for example provided with a filler opening 7, and a pressure regulator 8. The pressure regulator 8 consists mainly of a valve 9 and a membrane 10 which can command the valve 9. The valve 9 consists of a valve body 11, placed in the passage 12 between the pressure reservoir 6 and the reservoir 1 and connected with the membrane 10 via a valve spindle 13. The passage 12 first exits in a chamber 14 which is connected with reservoir 1 via openings 15. The ring 16 hereby exclusively performs the

function of nonreturn valve.

A chamber 17 is situated above the membrane 10 which prevents the pressure out of the reservoir 1 from acting on the top of the membrane 10.

The particularity of the present invention consists in that the pressure regulator has a membrane that mainly through its own elasticity provides the control operation of the valve 9. As explained in the introduction this offers the advantage that no springs need to be installed in the chamber 17, nor a gas under a well defined pressure need be provided. It is also clear that an atmospheric pressure normally prevails in the chamber 17, such from during the assembly, which is however to be disregarded concerning the control operation.

In figure 2 the operation of the pressure regulator is shown. Hereby the pressure reservoir 6 is put under pressure with the result that the chamber 14 and the reservoir 1 are filled with gas from the pressure reservoir 6, whereby the membrane 10 is elastically stretched out to the position according to figure 2, the downward force as a result of the elasticity of the membrane 10, by the construction of the membrane, is so chosen that the valve 9 reopens as soon as the pressure in the reservoir 1 falls under a defined value.

In figure 3 another variant is shown whereby the membrane has two functions, and is produced in the form of bellows. With the depression of the bellows the wall 18 of the filled pressure reservoir 6 is pierced, through which the pressure regulator 8 is set in operation. The closing of the valve 9 is nearly exclusively determined by the counteracting force caused by the elasticity of the membrane 10.

In the most preferable embodiment use will also be made of a membrane 10 as shown in figure 1, that is circular and

that shows a ring shaped part 19 with an arched cross-section.

The present invention is in no way restricted to the embodiments described as examples and shown in the drawings, but such pressure regulator for spray cans, and the membrane used herewith, may be developed in all kinds of forms and dimensions without departing from the scope of the present invention.

## Claims.

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1. Pressure regulator for spray cans, especially which make use of a valve (5) that is placed between a reservoir (6) which is destined to be filled with a gas under high pressure and a useful reservoir (1) of the spray can, and of a membrane (10) that commands the valve (9), characterised in that the pressure regulator (8) has a membrane (10) that mainly through means of its own elasticity provides the control operation of the valve (9).
2. Pressure regulator according to claim 1, characterised in that for the control of the pressure, in other words, for the movement of the valve (9), exclusive use is made of an elastic bendable membrane (10), which provides the control force through its elasticity.
3. Pressure regulator according to claim 1 or 2, characterised in that the membrane consists of plastic.
4. Pressure regulator according to one of the claims 1 through 3, characterised in that the membrane is mainly circular; that the membrane (10) has a ring shaped part (19) with an arched cross-section; and that the valve body (11) of the aforementioned valve (9) is mounted on the middle of the membrane, more especially is produced in one piece herewith.
5. Membrane for pressure regulators for spray cans, more especially for a pressure regulator according to one of the claims (1 through 4), characterised in that the membrane (10) is manufactured of plastic on basis of polyacetal.
6. Membrane according to claim 5, characterised in that it mainly consists of polyacetal.
7. Membrane for pressure regulators for spray cans, more



especially for a pressure regulator according to one of the claims 1 through 4, characterised in that it mainly consists of polyamide.

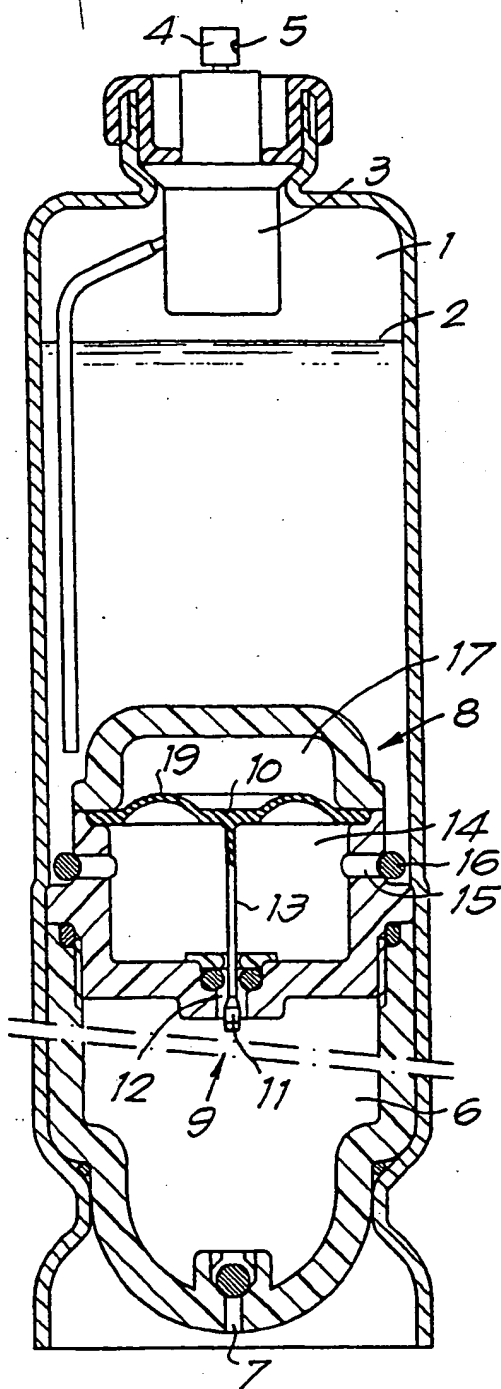
8. Membrane for pressure regulators for spray cans, more especially for a pressure regulator according to one of the claims 1 through 4, characterised in that it mainly consists of polysulphon.

9. Membrane for pressure regulators for spray cans, more especially for a pressure regulator according to one of the claims 1 through 4, characterised in that it mainly consists of polypropylene.

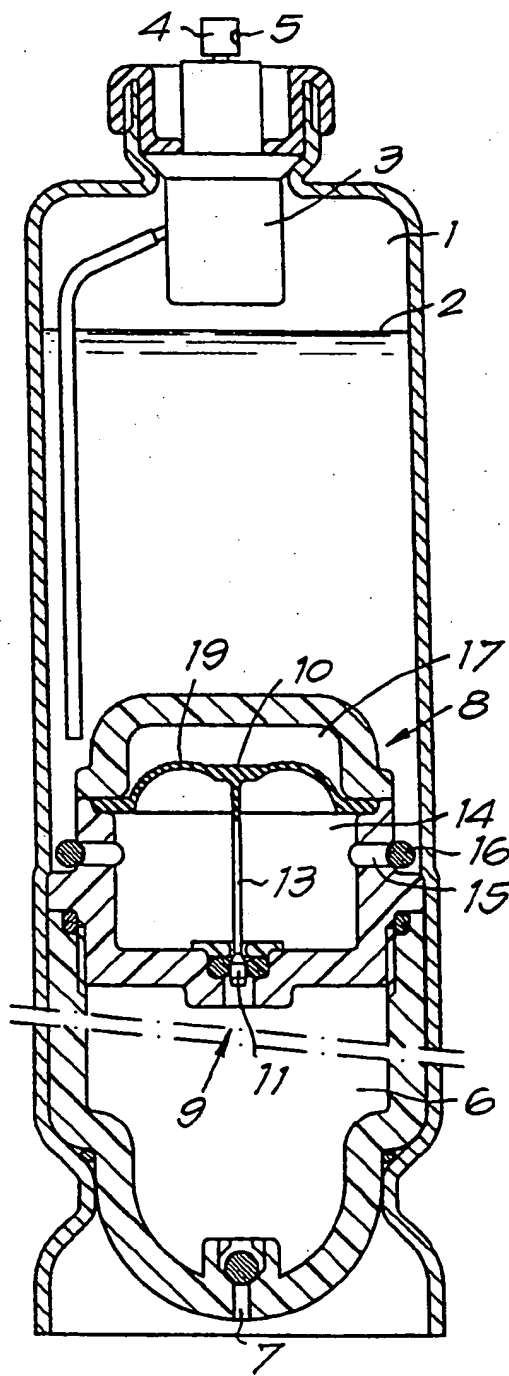
10. Membrane according to one of the claims 5 through 8, characterised in that it is circular and that it has a ring shaped part (19) with an arched cross-section.

11. Membrane according to one of the claims 5 through 8, characterised in that it shows the forms of bellows.

*Fig. 1*

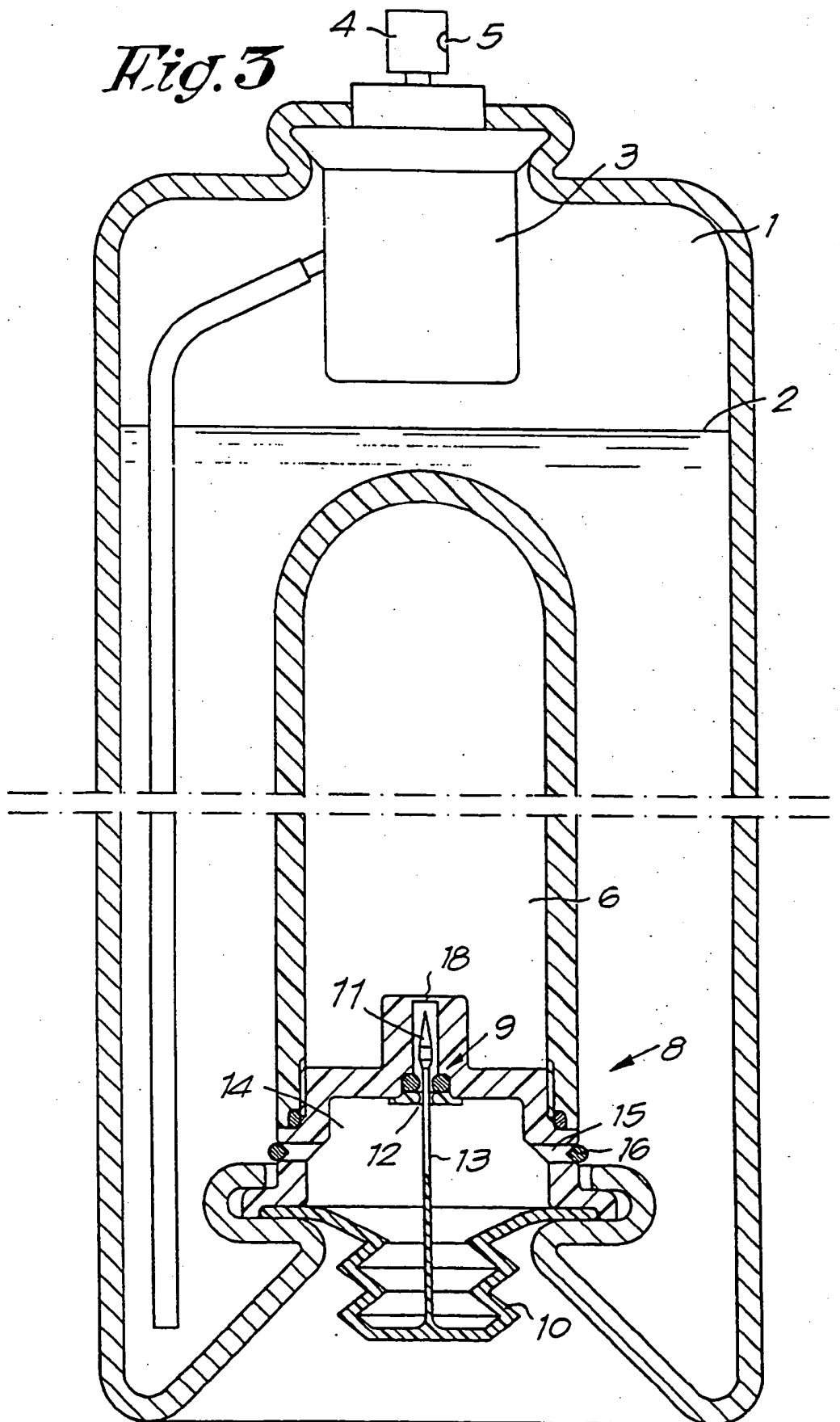


*Fig. 2*



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*Fig. 3*



## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/BE 90/00023

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC: Int.Cl. 5 G05D16/06 ; B65D83/14		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	G05D ; B65D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	US,A,3995778 (R. GAMADIA) 07 December 1976 see column 1, line 63 - column 2, line 20; figure ---	1-4, 6, 7, 9
Y	EP,A,315779 (F.P.D. FUTURE PATENTS DEVELOPMENT COMPANY S.A.) 17 May 1989 see column 4, line 46 - column 5, line 49 see column 6, line 38 - column 7, line 23; figures 1, 5 ---	1-4, 6, 7, 9
A	---	10
Y	PATENT ABSTRACTS OF JAPAN vol. 7, no. 055 (M-198) 05 March 1983, & JP-A-57 200652 (HONDA GIKEN KOGYO KK) 08 December 1982, see the whole document --- -/-	6
<p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
10 JULY 1990	27 JUL 1990	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	HELOT H.V. <i>H. H. V.</i>	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
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A	DE,A,2826633 (FREUND INDUSTRIAL CO., LTD.) 03 January 1980 see page 1, lines 1 - 18; figures 3, 5 ---	1

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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